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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume IX | MARCH, 1936 | No. 2

Competition and Research Develop Aluminum Industry

Reported by E. W. Moore

Rochester Chapter, Feb. 10—"The aluminum industry has been built on competition with other metals and on research that has made its present position possible in the short period of 50 years," said Edgar H. Dix, Jr., speaking on the subject of "Competition Among Metals."

The years of depression brought out the extremes of both good and bad competition. The benefits of bad competition and false claims of superiority are soon lost, but honest competition—recognizing the inherent characteristics of a metal, capitalizing on its good qualities, and learning to overcome its weaknesses—is of enduring benefit.

It was long study and experimentation that finally led Charles M. Hall, just 50 years ago, to the discovery of a practical electrolytic process for the reduction of aluminum oxide. The first aluminum produced by the Pittsburgh Reduction Co. (now Aluminum Co. of America) sold for $5 per lb. However, after a long program of investigations, in which fabricating technique and many new alloys of good strength and ductility were developed, aluminum was produced at a reasonable cost.

An early application of aluminum is the protective cap on top of the Washington Monument, which is in an excellent state of preservation after 50 years of service. The cap is 99.2% pure, weighed 100 oz., and cost $256.40. It was selected for its resistance to lightning!

Alclad products have a strong aluminum alloy core, and a pure aluminum coating offering electrolytic protection to the core. Aluminum cable with steel core for strength meets all requirements for high voltage transmission and is being used throughout the United States. In structural applications on aircraft, automobiles, trucks, and railway cars, where light weight with adequate strength is required, aluminum alloys are performing a fundamentally sound job.

Mr. Dix answered many questions from the members, who voted the meeting an outstanding one on the season's schedule.

(Other phases of Mr. Dix's talk are discussed elsewhere in this issue.—Ed.)

New York Lecture Course Is Unexpected Success

"Elements of Modern Ferrous Metallurgy" is the subject of the first educational course to be given by the New York Chapter.

Due to local conditions it was feared that such an activity would meet with little success in New York City. Fears were proved unfounded, however, by a registration of 97 and an average attendance of between 75 and 80.

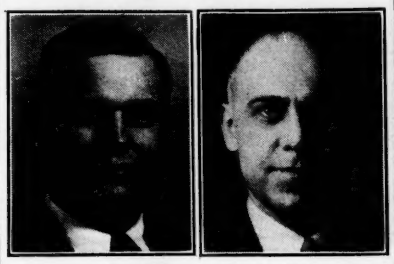
As a result of the course, the Chapter has added 23 new members, and 12 non-members have paid $5 to take the course with the option of applying that sum toward a membership at the conclusion of the lectures.

Much of the credit for the success of the course is due to R. H. Aborn, chairman of the Educational Committee, who arranged the program and secured very excellent speakers, and to the other members of the Committee, J. R. Vilella and J. T. Eash, not forgetting the genial Chapter secretary, "Tim" Holden.

See Nominating Committee Announcement on Page 2

New Chapter Opened In Mahoning Valley

Francis M. Walters, Jr.



Norman P. Goss *C. W. Weesner*

Another new chapter of the American Society for Metals came to life on Jan. 30 at a meeting held in the Ohio Hotel, Youngstown, Ohio. It is known as the Mahoning Valley Chapter and already has 39 members.

Francis M. Walters, Jr. of Youngstown Sheet & Tube Co. is chairman; Norman P. Goss, director of research of Cold Metal Process Co., vice-chairman; and C. W. Weesner, chief metallurgist of Sharon Steel Hoop Co., is secretary.

The first meeting of the chapter was held Feb. 10 and was attended by close to 50 men. A complete report is given on page 4.

Talk on Gas Fuels Leads To Other Heating Media

Reported by James Burns

Rockford Chapter, Jan. 22—George A. Uhlmeyer, industrial gas engineer of People's Power Co., Moline, Ill., spoke on "Recent Developments in the Utilization of Gas as an Industrial Fuel" at the January meeting. He delivered his talk in a concise, easy manner which made everyone feel at home and brought out considerable discussion.

Although the subject was confined to gas, the talk and discussion drifted into every type of fuel, and Mr. Uhlmeyer answered all questions in a satisfactory and unbiased manner, giving due credit to other heating means where special conditions warranted.

Atmospheric control was discussed, especially stressing the improvements it has already brought about and its almost unlimited possibility for future improvement.

Metal Melting Data Available

Anyone interested in metal melting or contemplating the modernization of a melting department will find invaluable a new booklet just published by the Campbell-Hausfeld Co., Harrison, Ohio.

Makers of oil and gas fired crucible furnaces themselves, these people have nonetheless presented an unbiased picture of the problems encountered in the selection of the proper equipment, and supply definite facts enabling the reader to decide for himself which type of furnace is best suited for his purposes.

Send Papers in Early

While there is still ample time for members and others to submit technical papers for presentation at the Metal Congress to be held in Cleveland the week of Oct. 19 to 23, the National Office will appreciate having the required information as far in advance of the limiting date for receipt of papers as possible. All offers of papers should be accompanied by a summary which should make clear the intended scope and important features.

Final date for acceptance of papers for preprinting is June 25, 1936, and for presentation but not preprinting, July 25, 1936.

Short-Time Creep Charts Are Questioned by Foley

Reported by J. P. Ahlbrandt

Chicago Chapter, Feb. 13—Francis B. Foley, superintendent of research at the Midvale Steel Co., was the guest speaker at the monthly meeting. Mr. Foley has been a member of the Society for 16 years and is past chairman of the Philadelphia Chapter.

A very interesting talk was given on "Steel Alloys for High Temperature Service." The construction of equipment for measuring elongation of alloys at elevated temperatures was shown by means of slides. On the basis of graphical representation of the measurements of creep over a period of several years, Mr. Foley questioned the authenticity of European charts for shorter periods of time. The actual curves for creep of alloys at high temperatures exemplify the statement that there is an annealing effect counteracting cold working caused by load on the specimen.

The effect of adding manganese, molybdenum and chromium to carbon steel, as determined by Grün, was shown, although the data were not complete. Various chromium-nickel austenitic steels were listed showing comparative tensile and design strengths at temperatures to 2000° F.

During the discussion it was learned that the addition of stellite and of molybdenum prevents the seizure of bolts and nuts in tests made at high temperatures.

Book awards for membership gains were made to E. C. Blocks, Jr., J. A. Leahy, and G. F. Ferry. Guests for the evening were Dr. Mahin of Notre Dame University, Mr. Fowle, President of the Western Society of Engineers, and J. J. Kanter of the Crane Co., who was the technical chairman.

Compares Alloys Used for Aircraft

Reported by G. R. Fitterer

Pittsburgh Chapter, Feb. 13— J. B. Johnson, chief of the Material Branch, U.S. Army Air Corps, spoke before the Pittsburgh Chapter on the subject "Aircraft Materials."

After describing the construction of various types of planes, designs of wings and fuselage structures, the speaker discussed the comparative properties of stainless steel and aluminum alloys for aircraft. Although the ratio of tensile strength to specific gravity (about 23,000) is remarkably similar for the two materials, certain other properties determine selection.

Thus, duralumin for the wing, fuselage, etc., may be rolled into wider and thinner sheets, and within closer gage limits than stainless steel. Alclad duralumin possesses corrosion resistant properties comparable to those of 18-8. Stainless steel, however, possesses the advantage of weldability. Metals have practically replaced wood, rubber, and resin products for propeller manufacture in this country. The blades are manufactured of aluminum alloy forgings, chrome-nickel-molybdenum steel forgings, and from chrome-vanadium steel strip in the form of a welded hollow steel blade. Hubs are manufactured from chrome-nickel-molybdenum and chrome-vanadium steel forgings heat treated to approximately 300 Brinell hardness.

Because both industries are well represented in Pittsburgh, the discussion, led by E. H. Dix, Jr. of the Aluminum Co., was lively and interesting.

Many Brave Coldest Day To Hear Die Casting Talk

Reported by L. W. Murray

Muncie Chapter, Jan. 23—In spite of the fact that it was the coldest day in 24 years in Anderson, Ind., about 40 men came out to hear J. C. Fox, chief metallurgist of Doehler Die Casting Co., talk about his favorite subject, "Die Castings."

The alloys used, melting and casting practices and materials used in casting equipment were among the points covered by Mr. Fox. He exhibited a number of miscellaneous parts, many of intricate design, cast of several different alloys.

Howard Stagg of Halcomb Steel Co. gave a short history of tool steels and showed three reels of film in a coffee talk preceding the regular program.

Members' Private Lives Revealed at Party

Reported by Walter M. Saunders, Jr.

Rhode Island Chapter, Jan. 16—As a mid-winter novelty, 60 members of the Rhode Island Chapter and guests assembled at the Old France Restaurant in Providence for an old fashioned "hoe-down."

Events included a banquet followed by some "Kneeling, Hardening, and Normalizing" furnished by an excellent floor show. From the entertainers we learned much about the hidden life of Carl Peterson, our venerable secretary; and Fred Franklin, Chester Morey, Clarence Bearse, and Cyril Broadhead came in for their share of shocking exposures of their supposedly secret "affairs." Merle Carruthers distinguished himself by his piano playing and song-leading, and while the Rhode Island Chapter does not wish to cast any asparagus on the New Haven Quartet, we feel confident that any two of our members can make more noise, qualitatively and quantitatively.

The State of Rhode Island Tercentenary Program is now under way, 1636 to 1936 (Advertisement). We see no reason, therefore, why a little more boasting can do any harm, especially if we can revive again some of the old liscords between the merrie gentlemen of the "Nutmeg State," and the free-thinking disciples of Roger Williams. In fact, we are confident that no quartet can approach ours, notwithstanding their respective abilities as steel treaters.

It seems logical, too, that the Rhode Island Chapter should receive the President's Mug this year, especially on its ability to run successful outings to say nothing of holding its membership to a very narrow fluctuation over a period of years. Stability is what counts, says we.

Handbooks!

Preparations for the next edition of the National Metals Handbook are now actively under way. Members are requested, however, not to return their old books until notified to do so by the National Office.

THE REVIEW

Devoted to the interests of the American Society for Metals

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Nominating Committee

As provided by the Constitution of the American Society for Metals, President R. S. Archer has selected the following Nominating Committee from a list of candidates submitted by the local chapters:

Chairman: **H. B. Northrup (Penn State Chapter)**
Pennsylvania State College, State College, Pa.

B. L. McCarthy (Buffalo Chapter)
Wickwire Spencer Steel Co., Buffalo, N. Y.

Erle F. Ross (Cleveland Chapter)
Penton Publishing Co., Cleveland, Ohio

M. E. Cummings (Syracuse Chapter)
Crucible Steel Co. of America, Syracuse, N. Y.

E. A. Thomas (Muncie Chapter)
Chrysler Corp., Newcastle, Ind.

R. W. Woodward (Hartford Chapter)
Underwood-Elliott-Fisher Co., Hartford, Conn.

C. R. Whittemore (Montreal Chapter)
Dominion Bridge Co., Ltd., Montreal, Canada

This Committee will meet during the third full week in the month of May for the purpose of naming one candidate for each of the following offices: President (1 year), vice-president (1 year), secretary (2 years), two trustees (2 years each).

The Committee will welcome suggestions for candidates. Endorsements of a local executive committee shall be confined to members of its local chapter, but individuals of a chapter may suggest to the Nominating Committee any individuals they so desire.

Metallurgy of Sucker Rods Interests Oil Producing Members in California

Reported by Louie W. Mosley

Los Angeles Chapter, Jan. 31—The January meeting of the Chapter was devoted to a subject of great interest to the large number of petroleum industry members—that of "Sucker Rods." Rolland H. Soll, metallurgist for the Emsco Derrick & Equipment Co. of Los Angeles, thoroughly covered the history, manufacture, and "trouble shooting" phase of this important piece of oil producing equipment.

Specifications for sucker rods are perhaps the strictest known in large-scale commercial applications. No heavy inclusions are permitted, inherent grain size and hot-bed grain size are specified, flakes must be eliminated, and each bar must be inspected for such surface defects as slag, scale, etc.

Heat treating is carefully controlled, and rods which have been kinked and later straightened are not acceptable. Upsetting of the rod ends for threading is done in five or six progressive stages. Care must be exercised to form a perfect upset without fatigue cracks or localized stresses. The ends of the rods are heat treated in a special slot-type furnace to just above the critical, quenched in oil, and drawn between 1050 and 1100° F. Some manufacturers apply this heat treatment to the entire rod.

The most popular steel now in use for couplings is S.A.E. 4615. In wells in which hydrogen sulphide is present, S.A.E. 2315 is usually specified. These couplings are carburized, hardened, and ground. Since corrosion resistance is even more important than strength, S.A.E. 4615 is commonly used for the rod also. The latest development in corrosion resisting rods is the use of very low carbon or "pure" iron, with only 4 or 5 points of carbon, and 3.5% nickel and 0.12% molybdenum added as alloying elements. The ultimate strength is about 70,000 psi.

Corrosion failures usually start as a pit, in which localized stresses are set up, starting a fracture which progresses across the rod. Another type of failure is due to excessive wear caused by crooked holes. Surface defects, such as nicks or small cracks, are responsible for localized stresses and progressive fracture. Mr. Soll's final warning on the use of rods under corrosive conditions was to make gas and water tests at the well.

The phenomenon of hydrogen embrittlement was discussed, it appearing that an intergranular absorption of hydrogen takes place, actually increasing the density of the metal and setting up localized stresses and stiffness which result in failures. Mr. Soll mentioned one severe case in a Mid-continent oil field where two complete strings of sucker rods were required. They were used alternately for two weeks each, thus allowing the string out of service sufficient time to return to normalcy.

New Oil Product Announced

A new processed oil product for deep drawing and precision grinding has been announced by Acme Refining Co., Cleveland, known as Acro Liquid Compound.

It is absolutely moisture-free, thus saving the extra freight paid on paste products, which all contain 30 to 45% water. Acro is easily measured, instantly soluble in water, and designed especially for exacting drawing or grinding production.

Interpretation and Correlation of Test Tools Is Presented

Reported by F. H. Clark

New York Chapter, Jan. 20—J. R. Townsend, Bell Telephone Laboratories, spoke on "Tools for Testing—their Interpretation and Correlation."

Mr. Townsend discussed hardness testing at some length and described the Meyers tester developed by the Bell Laboratories in an effort to eliminate certain factors such as creep of the penetrator under load. The Meyers machine, showing load in terms of penetration, will give a straight line relationship for nickel-silver alloys when hardness is plotted against tensile strength. Although no other machine will do this, Mr. Townsend recommended the Rockwell Hardness Tester as approximating this relationship.

In discussing tensile strength measurements, Mr. Townsend spoke of the lowered costs in preparing recessed test pieces of thin sheet metal by piling up several on top of each other and cutting them with a milling machine in one operation. In tensile strength determinations, the most important factors are ultimate strength, modulus and proportional limits. The latter may be quickly and accurately obtained with some of the new stress-strain recorders.

Mr. Townsend believes the reversed bending test, which is dynamic in nature, is better than the Erichsen test, which is static. In reversed bending, it is important to plot on log paper the ratio of mandrel radius to thickness of the sheet being tested against the number of 90° bends before fracture. Such studies have been applied to many types of flat bronze springs used in telephone terminal equipment.

Some interesting photomicrographs were included showing progressive stages of cracking at grain boundaries of lead cable sheath subjected to long time tension tests on static fatigue. Bending machines for full size lead cable and special machines for vibrating lead cable were also shown.

In discussing non-destructive testing, Mr. Townsend showed X-ray and gamma-ray photographs of a large number of objects. The advantages and limitations of X-ray technique were discussed.

Quality Control of Tool Steel Shows Progress

Reported by Ralph Leiter

Philadelphia Chapter, Jan. 3—A fine attendance at both dinner and lecture indicates a good and prosperous year for the Chapter. An even more substantial indicator was the impressive list of new members read off by Chairman George Keller.

The speaker of the evening, M. W. Dalrymple, gave a very interesting and comprehensive talk on tool steel, dealing with the means the steel maker has at his command for controlling and checking quality. Much progress has been made along this line in the past few years, due largely to the exacting requirements of the consumer and close cooperation between producer and consumer. Improved quality and uniformity is partially responsible for a trend back toward the use of plain carbon instead of alloy tool steel.

Joseph Winlock brought up the interesting question of the relative merits of open-hearth versus electric furnace, in the manufacture of a good grade of carbon tool steel. The speaker replied that good steel can be made by either method provided proper care is taken. Open-hearth tool steel can be made which is consistent in quality and can be used with very good results.

Another point brought out in the discussion is the method for removing a carbide network. Mr. Dalrymple advises a 1350° F. anneal for steels above 1.2% carbon and for steels below 1.0% carbon a normalizing treatment at 1600° F.

The technical part of the meeting was preceded by a fine talk by Dr. B. L. Keyes on "Psychiatry in Industry."

Gleanings From the Chapters

The National Society now carries 42 chapters and groups on its membership roster—one more than there were the last time we went to press. The newcomer is the Mahoning Valley Chapter, which holds its meetings in Youngstown, Ohio . . . It has 39 members and confidently expects 150 before the year is out . . . And judging from the energetic beginning the founders have made, we think they'll do it.

* * *

In the January issue of THE REVIEW we devoted a little space in this column to bragging about the membership gains made by the chapters. But it seems that the bragging was altogether too modest, for the St. Louis Chapter hastened to inform us that they *weren't* within three of their all-time high but had already passed it. . . . Their present membership is 113—seven higher than the old record.

* * *

Surprising talent is coming to light among A.S.M. members throughout the country . . . The New Haven Male Quartet is no doubt famous by this time, but its prestige is seriously challenged by Rhode Island Secretary Walter Saunders, who boasts that any two members of his chapter can make more noise both quantitatively and qualitatively. . . Merle Carruthers is their distinguished pianist and song leader.

* * *

Chicago Chapter has a band led by Jim Cook but refuses to divulge the personnel of the dance ensemble that recently provided entertainment. . . . It is said to consist of very beautiful chorines.

* * *

Mid-winter party season is now about over, and without receiving any formal report, we believe that Boston's "Quench and Draw" must have determined several transformation and saturation points and relieved some fatigue strains. . . . A. L. Knight was chairman of the committee responsible for putting it over.

* * *

A Monte Carlo party was given by the Canton-Massillon Chapter at which each member received $1,500 in cold cash for gambling and refreshments. . . . But since it was only A.S.M. currency, it probably didn't go very far.

* * *

Not every chapter can have a "dad" such as Philadelphia has officially adopted. . . . He is George Metzger, 79 years old, employed by Henry Disston & Sons for 66 years, where he is now foreman of the shop. He has been a member of the Society for ten years and seldom misses a meeting, particularly plant visits and smokers.

* * *

The problem of the modesty and reserve usually evinced by metallurgical speakers has been solved in the Cleveland Chapter by the use of a public address system that carries the mildest voices clearly to all parts of the hall.

* * *

Educational courses are in full swing, as will be seen by reports scattered throughout this issue. . . . New Jersey averaged an attendance of over 100 at the ten-week course on ferrous metallurgy completed in December. They are now studying non-ferrous materials.

* * *

Some of the men up in New York are still surprised at the success of the first lecture course ever to be given by that chapter.

* * *

The Ontario Chapter finds, on planning to stage their spring lecture course, that the interests of the members will be best served by having identical lectures in both Toronto and Hamilton on succeeding nights. . . . The extra expense should be offset by the new members acquired.

* * *

Cleveland's new course on heat treatment will consist in three lectures on "principles" to be presented by Kent Van Horn and three more on "practice" by Gordon Williams.

Many Notables at National Officers' Night in Chicago

Reported by J. P. Ahlbrandt

Chicago Chapter, Jan. 9—Men prominent in the A.S.M. as well as the metallurgical field, were present to greet a large gathering of approximately 250 guests and members of the Chicago Chapter. This first meeting of the new year was "National Officers' Night" and in attendance were President R. S. Archer, Vice-President E. C. Bain, Secretary W. H. Eisenman, Treasurer W. P. Woodside and Trustees Reid L. Kenyon and Walter Mathesius. Ted Barker held down the founder members bench along with Bill Woodside; also present were Past Presidents Robert Guthrie and Fletcher Harper, Past Treasurer A. T. Clarage, Ed Donnellan, editor of the National Metals Handbook, and Prof. H. F. Moore, authority on fatigue of metals.

Entertainment was furnished during the dinner by the Chapter band, led by Jim Cook of Kloster Steel and composed of A.S.M. members. Instruments were played courageously and group singing was interspersed with both vocal and instrumental solos. A dance ensemble consisting of beautiful chorines, selected carefully from the members, climaxed the entertainment.

Vice-President Bain awarded 15 honorary memberships to students in recognition of their interest in science and its application to metals, and their scholastic standing. They represented six collegiate institutions. Secretary Eisenman expressed his gratitude to the Chapter for its contribution to the success of the convention and exposition last fall. A tribute was also paid to the new junior members.

President Robert S. Archer, as the speaker for the evening, was introduced by Walter Mathesius. Bob discussed various questions under the heading "Does Research Pay?"

Research must be new and essentially creative before profits can be realized, although there is no guarantee of profits to either the organization or the individual. Conditions favorable to profitable research include: (1) An excess of resultant value over development cost and a saving over existing processes, (2) the use of market analysis to justify the cost, and (3) the use of reasonable means to speed up the work through intelligent and economical planning.

The speaker stated that research is more of an art than a science. Artistic craftsmanship can be supplemented by scientific control and analysis. The growth of industrial research over the past 150 years has resulted in closer uniformity and increased scientific control. College training does not seem essential to the research worker, since intuition and a keen sense for searching facts are not found in books.

During the discussion, Bob Archer repeated his limited definition of the word research as a process of "continued efforts carefully made." He replied to the question, "What was the most outstanding development of 1935?" by suggesting the improvement of the bessemer process.

Competition Among Metals Illustrated by Aluminum

Reported by G. W. Quick

Washington Chapter, Jan. 20—The theme of the talk by E. H. Dix, Jr., of Aluminum Research Laboratories, on "Competition Among Metals" was the premise that the most suitable metal for a given application is the one fulfilling requirements at the lowest possible cost.

Using the displacement of certain metals by aluminum as an example, he pointed out that although this displacement has sometimes been to the detriment of one metal, it often has benefited other metals as well as aluminum. For instance, aluminum cable, steel reinforced (ACSR) has displaced copper in some 400,000 miles of lines but, in so doing, has consumed a substantial quantity of galvanized steel wire, to the advantage of the steel and zinc industries.

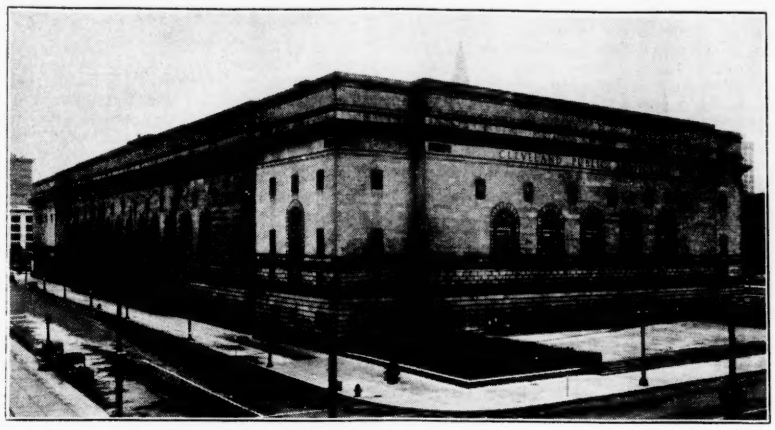
150 Attend Peoria Course

Dr. Marcus A. Grossmann's series of lectures on "Principles of Heat Treatment" presented at the National Metal Congress last fall is proving very popular as an educational course in the Peoria Chapter. Attendance after the fourth of the ten lectures averaged 150.

Other chapters that are presenting Dr. Grossmann's course are Boston, Northwest, Los Angeles, and Ontario.

The ever-popular educational course originated by Dr. A. Allen Bates on "Fundamentals of Ferrous Metallurgy" is being sponsored this year by the Montreal, Buffalo, Schenectady, Golden Gate, and York Chapters.

Metal Congress Arouses Unusual Interest



The Public Auditorium, Cleveland, where 1936 National Metal Exposition will be held

The 18th National Metal Congress and Exposition, which will be held in Cleveland for the first time in seven years, is arousing unprecedented advance interest. The event will take place the week of Oct. 19 to 23. This date is a little later than customary, but has met with full approval.

Floor plans for the Exposition will be ready for distribution by April first. It will be held in the New Exposition Hall of Cleveland's $15,000,000 Public Auditorium, which has available a total exhibit space of 260,000 sq. ft. Ten meeting rooms ranging in seating capacity from 90 to 500 will be available, and facilities include a ballroom and Little Theater seating 1500 and 700 respectively.

Arrangements for the technical sessions are progressing rapidly and a fine assortment of papers is assured.

Latest Information About Nitriding Is Presented

Reported by W. L. Fleischmann

Schenectady Chapter, Feb. 11—The Chapter was called to attend a lecture on New Developments in Nitriding by Prof. V. O. Homerberg of M.I.T. Members appeared in numbers to hear this promising talk, and they did not return home disappointed.

The nitriding process has preempted a field of application where extreme surface hardness (1000 Vickers-Brinell) is required with least distortion during the hardening process. Shafts, cylinder linings, valve stems are examples.

Although the greater part of all the steel nitrided is of the original 1 to 1.25% aluminum composition, other alloy steels can be successfully surface hardened by this process. Some are aluminum-free steels. Chromium, titanium, and vanadium, as well as aluminum, combine with nitrogen to form stable nitrides.

The famous 18-8 stainless steel and other austenitic steels can be nitrided after removing the passive layer with hydrochloric acid or by other reagents and methods. Also cast iron containing aluminum, chromium, and molybdenum has been successfully nitrided and is finding many industrial uses.

A. F. A. Members Attend Meeting on Cast Steel Addressed by Melmoth

Reported by Gordon T. Williams

Cleveland Chapter, Jan. 6—"Steel Castings," subject of the January meeting, attracted 100 to dinner and 150 others later. Speaker was F. A. Melmoth, vice-president of Detroit Steel Casting Co.

Steel founder members of the newly established Cleveland section of our alert contemporary, the American Foundrymen's Association, were invited to attend, and many did so. Guests of honor included D. M. Avey, A.F.A. president and editor of "Foundry"; Frank Steinebach, also of "Foundry," and active in Cleveland A.F.A. doings.

Our Chairman Pulsifer has lately been exhibiting at least one past chairman at the speakers' table each meeting. (Your reporter trusts that the objective is to remind the chapter of the great days of the past, and not to show us how well off we are now!) Two such were hailed at this meeting—Don M. Gurney, of Warner and Swazey, who led the chapter in the late twenties; and Harry Schwartz of National Malleable, chairman in the middle twenties, who was again presented later, this time as Dr. Harry Schwartz, technical chairman of the current meeting, a role which he ably filled.

Mr. Melmoth, in the technical address, clearly presented data to show that the controlling difference between forgings and castings is more a matter of regulation of solidification by design than the effect of mechanical work. Test results and photomicrographs were offered in support of this thesis. The size of the steel casting industry, its position of service to engineering design, and the place of research in foundry production were detailed.

Coffee talker was David L. Cowles, ballistics expert of the Cleveland Police Department; he was permitted to address the chapter on "Scientific Crime Detection" only after agreeing not to pick up any of our disreputable characters. His talk was a clever and lucid explanation of modern ballistics laboratory methods.

Tri-City Holds Stag Party

Reported by Edwin F. Bicknell

Tri-City Chapter, Feb. 28—The annual stag party, held at the Rock Island Arsenal auditorium, was enjoyed by 115 members and friends.

J. A. Gustafson of the Farmall quartet, acting as master of ceremonies, presented the following program: The Timmerman and Gordon dancing and singing team, the Farmall quartet, Jackie Greenwood in saxophone, dance and song numbers, Floss Gosjean, the ventriloquist, and Benny Willems with his steel electrical guitar.

After the entertainment, refreshments were served. G. F. Jontz, chairman of the program, was assisted by Jack Taylor, H. E. Ardahl, and George Uhlmeyer.

Arc Welding Expert Has Many Listeners

Reported by John W. McBean

Ontario Chapter, Jan. 10—A bumper meeting for attendance necessitated adjournment to a larger room after the dinner. Even this room was taxed to capacity with nearly 300 present to hear David Boyd of Dominion Bridge Co., Montreal, whose reputation as a speaker and authority on arc welding attracted a large number of outsiders as well as members of Dominion Bridge Co.'s Toronto staff.

Mr. Boyd discussed arc welding machines, a.c. and d.c., single and multiple operator, automatic machines, their costs, characteristics, advantages and disadvantages.

The preparation of the various joints, such as single V, double V, and special square butt for heavy plate, were taken up and the importance of cutting away slag and unsound metal with the chisel clearly shown. The proper methods of preparing fillet welds and butt joints for pressure vessels, and the precautions required by welds in tension or torsion, were illustrated by examples.

Reference was made to various errors caused by lack of confidence in welding and especially lack of knowledge of necessary design principles. Disastrous results so caused and the reasons for them were cited.

The effect of local expansion stresses due to heat was shown, and stress relief both by peening and heat treatment explained. Mr. Boyd told how concentrated stresses can be produced by incorrect design and showed them graphically by photographic slides of celluloid models.

In discussing various welding rods, the heavily covered rod was shown to give not only a smooth appearance but protection to the weld metal by three means—the sheath, the slag, and the gas blanket.

Inspection methods and the training of suitable operators were covered, and as usual the questionnaire was an interesting feature of the meeting.

Ingot Iron and Sheet Metal Are Discussed by Trustee

Peoria Chapter, Feb. 10—Members and their guests were entertained by Reid L. Kenyon, chief metallurgist of the American Rolling Mill Co., Middletown, Ohio, and trustee of the Society.

Mr. Kenyon's discussion covered the manufacture, uses, and advantages of Armco ingot iron, which is well known for its purity and corrosion resistance. He also discussed problems confronted in the forming and drawing of sheet metal. One of the interesting phenomena described was the grain growth of sheet steel in relation to amount of cold work and subsequent annealing temperature.

Following this discussion two reels of movies were shown illustrating the manufacture of all-steel automobile bodies. Striking tests showing the relative destructibility of a composite wood and steel body as compared to an all-steel body were made by driving the completed automobile over high cliffs and noting the results.

Instantaneous Flame Control Is Provided by New Device

The need for instantaneous flame control in industry to prevent explosions by cutting off the fuel line instantly has led to the application of a well-known principle involving the ability of the flame itself to conduct an electric current to a control instrument. Such a control assures instantaneous action, while instruments using either heat or light control are subject to an interval sometimes amounting to several seconds.

The Thermo Control Devices of Chicago has developed an instrument called the "Flame-otrol" to control feed lines. It operates through an electrode placed in the flame, the flame itself completing the electrical circuit. When the flame is cut off, the Flame-otrol instantly functions by means of a radio tube and relay to actuate a valve shut-off. The result is split-second performance.

'Corten' Makes Possible Large Weight Saving At Slight Extra Cost

Reported by Ralph Leiter

Philadelphia Chapter, Jan. 31—G. N. Schramm, assistant manager of the Research Laboratory, American Sheet and Tin Plate Co., Pittsburgh, addressed a large and responsive group of members and guests. Mr. Schramm's talk dealt with "Recent Developments in Strip, Sheet and Plate Metals" with particular emphasis on the new low alloy, high strength steels.

Mr. Schramm spoke at some length on "Corten," one of the several commercial high strength, corrosion resistant steels for structural use. The higher strength of these steels coupled with design changes makes possible weight savings of 18 to 60% at very little extra cost. The transportation industry is showing real interest in these steels; railroads are using them extensively for freight and passenger car construction.

The discussion following the lecture was broad and active. The first question was on the impact values of "Corten" at subnormal temperatures. Mr. Schramm had test data showing the alloy steel to be superior to rivet steel. A question on relative corrosion resistance brought out the fact that "Corten" in industrial atmospheres is at least twice as resistant as 0.2% copper steel and more than four times as resistant as plain carbon steel.

Other questions brought out the following information: "Corten" is readily and successfully welded by any of the common methods. Its increased strength is due to ferrite strengthening of the alloy additions. It is not a heat treatable alloy in the common sense of the term. Sheets are furnished as annealed and plate as normalized. Sheet can be bent flat on itself, but is not recommended for extra deep drawing.

The dinner preceding the lecture was attended by about 120 members and guests. Mr. Clemsen, district manager of T.W.A. gave an interesting and stimulating coffee talk on the present status of American air transportation.

Six Chapters Will Have Speakers on Regional Program

The second biennial inter-chapter meeting of the Pittsburgh, Philadelphia, Lehigh Valley, York, Penn State, and Southern Tier Chapters of the A. S. M. will be held at State College, Pa., Friday and Saturday, May 1 and 2.

Each of the six chapters is sponsor for one speaker on the program. A number of the national officers, including President Robert S. Archer, Vice President Edgar C. Bain, Secretary William H. Eisenman and Assistant Secretary Ray T. Bayless, will be present.

The program includes technical sessions on Friday afternoon and Saturday morning and an informal dinner on Friday evening at the Nittany Lion Inn, followed by an entertainment presented by student performers under the direction of J. E. Kennedy, coach of the Penn State Thespians.

Special entertainment is being provided for the ladies and they will be very welcome.

The technical program is as follows:

"Austenitic Grain Size in Steel," by Edgar C. Bain, Assistant to Vice President, United States Steel Corp., New York City. (Representing the Penn State Group.)

"Variants Affecting the Grain Size Rating of the McQuaid-Ehn Test," by Reinhold Schempp, Metallurgist, Halcomb Steel Co., Syracuse, N. Y. (Representing the Southern Tier Chapter.)

"Invisible Rays in Modern Engineering," by Dr. Gilbert E. Doan, Associate Professor of Metallurgy, Lehigh University, Bethlehem, Pa. (Representing the Lehigh Valley Chapter.)

"Austenitic Alloys of the 18-8 Type; Their Working Characteristics and Behavior," by Dr. V. N. Krivobok, Professor of Metallurgy, Carnegie Institute of Technology. (Representing the Pittsburgh Chapter.)

"Grinding Strains and Grinding Cracks in Hardened Tool Steel," by James G. Morrison, Metallurgist, Landis Machine Company, Waynesboro, Pa. (Representing the York Chapter.)

"Welding Viewed from a Somewhat Different Angle," by Dr. T. Holland Nelson, consulting Metallurgical Engineer, Philadelphia. (Representing the Philadelphia Chapter.)

A special number of *Mineral Industries* containing complete program and other information will be sent to all members of the six interested chapters about April 20.

All who are interested are cordially invited to attend the meeting whether or not they are members of the Society. It is suggested that hotel reservations be made early because the College Junior Prom is the same date.

A. S. M. Member Invents Corrosion Proof Process

Ihrigizing is the name of a process invented and developed by Dr. H. K. Ihrig at Globe Steel Tubes Co., Milwaukee, for producing a corrosion resistant steel.

Dr. Ihrig, a member of the A.S.M. Milwaukee Chapter, is a graduate of University of California. He began his search for a corrosion resistant material while he was employed in the oil and gas industry, and has been experimenting with the Ihrigizing process for five years, the last 2½ years at the Globe plant.

The process provides for the incorporation of silicon in the surface of steel in much the same manner as case hardening. Depth of case varies from 0.021 to 0.013 in., depending on the use to be made of the steel. The case contains about 14% silicon.

Exhaustive tests indicate corrosion resistance superior to that of stainless steel. Ihrigized steel successfully resists boiling nitric acid and scaling up to 1800° F.; it does not seize.

Globe Steel Tubes Co. has recently gone into commercial production of Ihrigized steel. The Waukesha Motor Co. and the Crane Co. are experimenting with the material for use in their products, while several other organizations have already shown considerable interest.

Rigid Control Maintains Cleanliness in O. H. Steel

Reported by J. N. Ostrofsky

Baltimore Chapter, Feb. 10—Thomas G. Foulkes, metallurgical supervisor of the Bethlehem Steel Co., Bethlehem, Pa., addressed the Chapter at its fifth monthly meeting. His subject was "Open-Hearth Melting Practice," and included the limitations and advantages of the acid, basic, and duplex processes, selection of raw materials, melting and pouring practice, production of special analyses, and the practical aspects of grain size control.

Mr. Foulkes emphasized the importance of cleanliness in the pit, and described the rigid control which is maintained in good open-hearth practice. Molds are allowed to cool to a predetermined temperature before being dipped, the preferred method of applying coating. Temperatures are checked with a thermocouple and if below a specified point, the molds are held back and later sprayed. They are inspected and vacuum cleaned before teeming.

Grain size control proved to be a subject arousing great interest. Best grain size is not always the finest. For example, exacting machinability requirements may warrant coarse grain. Variation in grain size is caused by several factors now fairly well known and controlled. Small amounts of aluminum play an important role, but mechanical and thermal treatment may be equally important.

Steel Enameling Book Issued

The recently published "Handbook on Design of Metal Parts for Porcelain Enameling" is the work of a Committee on Design of the Porcelain Enamel Institute, composed of recognized authorities in the industry.

It gives practical information on the proper design of pressed steel shapes. Copies of the booklet may be obtained by writing the Educational Bureau, Porcelain Enamel Institute, 612 North Michigan Ave., Chicago.

New Stainless Steel Is Structural Alloy

Reported by G. R. Fitterer

Pittsburgh Chapter, Jan. 9—A record attendance marked the first meeting to be held by the Chapter in its new quarters — the air-conditioned Gold Room of the Roosevelt Hotel. W. B. Arness, metallurgist for the Rustless Iron Corp., delivered a very informative talk on the general aspects of stainless irons and steels.

Mr. Arness' discussion involved the effect of nickel on the iron-chromium diagram and the metallographic constituents in the grades known as 18-8, 15-18, and 10-15. He pointed out that in 18-8, carbon solubility is approximately 0.02% and that it is desirable to keep this constituent below that value to prevent carbide precipitation. Titanium can also prevent it by dispersing the carbides in a random manner. How each method produces a similar result in a different way was shown, and a few remarks directed toward the economics of the two methods.

The 10 to 15% chromium cutlery alloy has good hardening and stainless properties. An addition of nickel increases the hardening power, provided there is a chromium-carbon balance which, without nickel, produces a stable alpha phase. Silicon stimulates grain growth.

The speaker discussed the development of a new structural alloy known as RR-11, which contains approximately 10% chromium and is nearly carbon-free. It may be easily rolled into sheets and formed either hot or cold. It has a tensile strength of about 80,000 psi., a yield point of 50,000 psi., and an elastic limit of 30%. It also has high impact properties (100 ft-lb.) and a high fatigue limit (40,000 lb.). This material is being offered to the railroad field and the coal mining industries and is a deliberate attempt to exploit the commercial possibilities of a low cost stainless steel.

Waterhouse Covers Long List of New Developments

Reported by Walter M. Saunders, Jr.

Rhode Island Chapter, Feb. 4—The Chapter was fortunate in having as speaker for this meeting a trustee of the Society, Dr. G. B. Waterhouse of M.I.T., who talked on "Recent Developments in Ferrous Metallurgy."

Space permits only brief mention of some of the numerous developments he was able to include, as follows: The Perrin Process of steel making, and the importance of slag reactions; the trend toward low alloy, un-heat treated steels in this country; the revival of the Bessemer process in England under government subsidy, and the interest in it in the United States, because of the higher phosphorus desirable in the new low alloy steels; prevention of intercrystalline corrosion of 18-8 with titanium or columbium; high frequency furnaces up to 5 tons capacity for melting, and high frequency heat treating furnaces; Brackelsberg furnaces; balanced draft cupolas; rolling mills for wide strip and Steckel mills; welding and gas cutting; and controlled atmospheres.

Such an imposing array of subjects would be difficult for anyone to describe in an evening's talk, but Dr. Waterhouse's ability as a teacher was clearly evident in bringing to our attention all the salient points in each.

Rockford Has Gill Course

Rockford Chapter started a second lecture course this season on February 6. The subject is Tool Steels and it is based on the course presented by James P. Gill at the 1934 National Metal Congress.

There will be six lectures, all presented by chapter members, except the last, which will be given by Mr. Gill himself.

The New Haven Chapter presented Mr. Gill's course in the fall and Boston is now planning to hold it this spring.

Mahoning Valley Is Active Steel Producing Center

Reported by D. S. Klippert

Mahoning Valley Chapter, Feb. 10—The newly organized Mahoning Valley Chapter of the A.S.M. was addressed at the first meeting by Dr. A. A. Bates, associate professor of metallurgical engineering, Case School of Applied Science.

Dr. Bates gave an interesting discussion relative to the future of the steel industry in the Mahoning Valley. Because of the huge amount of money invested in steel in the Mahoning Valley, and because of the probable future trends in steel markets involving the growth of such outlets as housing and household equipment, he predicted that we need not worry about the status of the Valley as a steel producing center for many years to come. Numerous charts and figures were presented showing the percentages of steel going into various products, the decreasing yield—ingot to finished product—caused by more rigid requirements, and other data.

About 50 were present for the initial meeting, including Chairman Harry Pulsifer of the Cleveland Chapter, and Harry Croft, Gordon Williams, and Harry Churchill, also of Cleveland.

General discussion followed by subsequent introduction of many of the members terminated the meeting.

Oxygen Limit for Copper Wire Bars is 0.03—0.06%

Reported by Walter C. Troy

Notre Dame Group, Jan. 17—J. Walter Scott of Western Electric Co. spoke to the Notre Dame Group on "Copper and Copper Alloys."

The importance of oxygen in securing a "level set" on cast copper wire bars was stressed during the first part of the lecture. The limits of the oxygen content were set at approximately 0.03 to 0.06%. The failures and flaws resulting when the oxygen content was outside these limits were illustrated with radiographs and photomicrographs. In discussing the effect of cold work, Mr. Scott showed that the maximum tensile strength to be expected in cold worked copper is 74,000 psi.

South Bend industrialists attending the meeting received much valuable and pertinent information on the more common brasses and bronzes. Many bearing metal failures containing lead were explained on the basis of the maldistribution of the lead globules in the particular alloy.

Mr. Scott closed the lecture and satisfied the ferrous-minded members by discussing a lantern slide showing the potent effect of copper on corrosion of plain low carbon steels.

Advertising Man

Well-known industrial firm has a place in its advertising department for a general utility man.

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Sound technical education and at least five years of industrial experience required. Must be able to write well, but previous editorial or advertising experience not essential.

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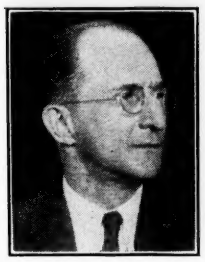
HERE AND THERE WITH A.S.M. MEMBERS

One of the old reliables in the Chicago Chapter (long-time Executive Committee member and past chairman), ADAM M. STEEVER, has been appointed superintendent of the Columbia Tool Steel Co.'s manufacturing plant at Chicago Heights, Ill.



A. M. Steever

Mr. Steever began his business career in the shops of the Buick Motor Co. at Flint, Mich. and progressed from there to Chevrolet's first metallurgical division. Followed in succession a term with the U.S. Government Aircraft Metallurgical Inspection and Control Service, a return to Buick, employment by the Wyman-Gordon Co. Ingalls-Shepard Division, and seven years as product and equipment metallurgist with Great Lakes Forge Co. For the past two years, Mr. Steever has been with the Lindberg Steel Treating Co. and the Lindberg Engineering Co.

In addition to his chapter activities, Mr. Steever is also serving on the Metals Handbook Committee of the A.S.M. He is a member of the A.I.M.E., A.S.T.M., and S.A.E. Forging is his specialty.

* * *

Dr. Paul D. Merica, with International Nickel Co. since 1919, has been elected a vice-president. As director of research for many years, he had general supervision of the company's research laboratories in the United States and England as well as establishing bureaus of nickel information in Paris, Brussels, Frankfort, Milan, and Tokio. He became assistant to the president in 1931. Prior to 1919 Dr. Merica was metallurgist at the Bureau of Standards.

P. D. Merica

His association with the American Society for Metals has been long and fruitful, and he is now serving on the Finance Committee.

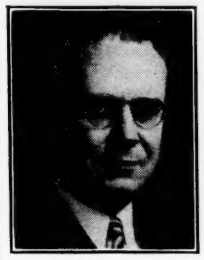
H. C. SMITH, chief metallurgist for Otis Steel Corp., paved the way to new jobs for two brothers and fellow members of the A.S.M. Cleveland Chapter when he resigned to go with National Steel Corp., Detroit.

PAUL J. MCKIMM replaced Mr. Smith as chief metallurgist and left his former position as metallurgical engineer in charge of steel works operations open for his brother RALPH.

Prior to his present five-year term with Otis, Paul McKimm was connected with the Wheeling Steel Corp., Youngstown Sheet & Tube Co., United Alloy Steel Co., and Central Steel Co.

* * *

For manager of the Metallurgical Department, Chicago District, Carnegie - Illinois Steel Corp. has chosen RAYMOND K. BOWDEN.



R. K. Bowden

Graduation from Ohio State University in 1920 was followed by two years as assistant chief inspector at Central Steel Co., Massillon (now Republic), and one year in the heat treating department of the Crucible Steel Co., Park Works. Two more years were spent teaching metallurgy at Carnegie Tech before the industrial field claimed him again and he returned to Central. In 1930 he joined the Illinois Steel Co. as superintendent of alloy production at the South Works, and was placed in charge of the General Production Department shortly after. Five years later he became assistant to the general superintendent.

Mr. Bowden numbers among his outside activities a membership in the A.S.M. Chicago Chapter, the Society of Automotive Engineers, and the American Society for Testing Materials.

* * *

Another new Carnegie-Illinois appointment is EDMUND L. ROFF, JR. for metallurgist at the South Works. From 1914 to 1929 he was with the Hyatt Roller Bearing Co. and from 1930 to 1936 with U. S. Steel Corp. Research Laboratory.

* * *

A.S.M. President BOB ARCHER and HARRY MCQUAID were speakers at an educational program sponsored by the Saginaw Malleable Iron Division of General Motors Corp. in January.

JANET ZAPH BRIGGS, who favors the Golden Gate Chapter with one of the few feminine memberships in the A.S.M., received her doctorate in mining engineering from Leoben, Austria, at the end of January. After a short trip in Northern Europe, she will return to California about May 15.

* * *

A sister metallurgist and A.S.M. member, REBECCA HALL, was married last October to EDWIN K. SMITH, metallurgist with Electro Metallurgical Corp. and also a member of the Society.

* * *

". . . And another bachelor bit the dust" on Jan. 15 when HYMAN BORNSTEIN, Executive Committee member of the Tri-City Chapter and cast iron expert, was married to Carolyn Jeanette Landauer.

"Hy" has also been nominated for vice-president of the American Foundrymen's Association for 1936-37.

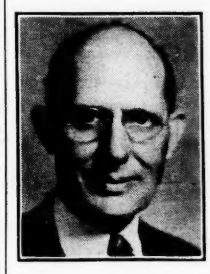
* * *

H. EINAR ARDAHL, vice-chairman of the Tri-City Chapter, has been transferred from the Deere & Co. Testing and Research Laboratory at Moline, Ill. to the John Deere Tractor Co. at Waterloo, Iowa, as chief metallurgist.

* * *

FRITZ EBERLE, Philadelphia Chapter member, joined the Duquesne Works of Carnegie-Illinois Steel Corp. in November. A 1922 graduate of the Technical University of Munich, Germany, with a degree of Dr. Ing. in Chemical and Metallurgical Engineering, Dr. Eberle was head of Metallurgical Research of Leeds & Northrup Co. since 1930.

* * *



C. F. Kettering

The Washington Award is an honor conferred annually, when deserving candidates are found, on a brother engineer by his fellow engineers (a commission composed of 18 members of five engineering societies) for "accomplishments which pre-eminently promote the happiness, comfort and well-being of humanity."

Brother Engineer CHARLES FRANKLIN KETTERING, vice-president of General Motors Corp. in charge of research, richly deserves the award for his long list of inventions and engineering improvements, principal among which might be considered the Delco starting, lighting and ignition system for automobiles and the Delco farm lighting system.

Mr. Kettering's formidable list of honors and affiliations includes an honorary membership in the American Society for Metals.

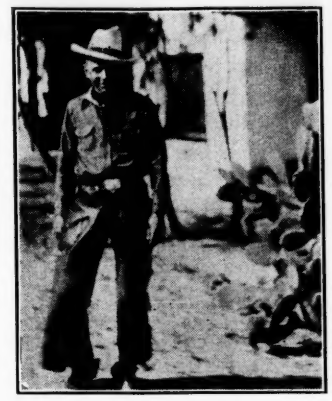
* * *

W. R. JENNINGS first entered the castings field as representative of the Pittsburgh Testing Laboratory, stationed at the Industrial Works in Bay City, Mich. As long ago as 1919 he became superintendent of the Bay City Foundry & Machine Co. From 1925 on he was foundry manager successively for Baker-Perkins Co., Inc., Saginaw, Mich., Frank Foundries Corp., Moline, Ill., and Ecorse Foundry Co., Ecorse, Mich.

He has now been made foundry supervisor for Deere & Co., Moline, Ill. at the tractor plant in Waterloo, Iowa.

* * *

H. Kramer & Co., Chicago, refiners and producers of non-ferrous metals and alloys, have acquired the services of a director of research well grounded in all phases of metallurgy. He is GEORGE P. HALLIWELL, who graduated in chemistry from Worcester Polytechnic Institute, and after a year as chemist for the City of Worcester, joined Bridgeport Brass Co. Here he became interested in metallurgy and four years later went to Yale for his M.S. in that subject. He was then for ten years metallurgist at the Westinghouse Research Laboratory, and since 1930 has been assistant professor of metallurgy at Carnegie Institute of Technology.



The gentleman in the somewhat unusual heat treater's garb is HARVEY ANDERSON, past-chairman of the Chicago Chapter. "But the old original heat treater Sol has sure made a stronger man out of me," he writes from Tucson, Ariz., where he has spent the past two months putting on about 10 lb. in weight and several coats of tan.

Horseback riding through the desert cacti in the foothills of the Santa Catalina Mountains and learning how experts buck broncos and bulldoze steers at the Annual Rodeo, surrounded by an atmosphere of Indians, cowboys, and cowgirls, seems to be agreeing with him.

* * *

JOHANNES ERLER, selected as the author of the American Foundrymen's Association exchange paper to the International Foundry Congress in Düsseldorf, Germany, next September, was born and educated in Germany. He began his industrial career in this country in 1926 as chemist for Carus Chemical Co., La Salle, Ill. In 1928 he became metallographist at Wilson Foundry & Machine Co., Pontiac, Mich.; in 1930 sales engineer at Eastern Clay Products Co., Buffalo; and in 1932 metallurgist for the Farrel-Birmingham Co., Ansonia, Conn.—his present position.

New Haven is, of course, his A.S.M. chapter. He also belongs to the A.F.A., the A.S.T.M., and the Verein Deutscher Giessereifachleute.

* * *

Just last July THE REVIEW carried an announcement of the appointment of S. D. WILLIAMS to be manager of tube sales for Timken Steel & Tube Co. Mr. Williams is still on his way to bigger and better things, however, and in the intervening months has graduated to the position of director of sales.

Deaths

JOHN KERSHAW SCHOFIELD, well known in steel manufacturing circles of Canada, died of pneumonia, Jan. 17, at the age of 51 years.

Mr. Schofield was born and educated in London and came to Canada in 1913. His first position was with the Grand Trunk Railway, but three years later he joined the firm of Arthur Balfour & Co. In 1922 he became associated with Edgar Allen & Co., where he has since remained.

Mr. Schofield was chairman of the Montreal Chapter, A.S.M., in 1933-34, and treasurer the following year. Jack, as he was generally called, was a splendid worker for the Chapter and his influence will be missed.

* * *

The Scleroscope, an instrument for measuring hardness of metals, is associated throughout the world with the name of ALBERT F. SHORE, president of the Shore Instrument & Mfg. Co., Jamaica, N. Y. Death terminated Mr. Shore's career as inventor, metallurgical engineer, and writer on Jan. 17 at the age of 59 years. He was awarded the Elliot-Cresson Medal from the Franklin Institute and was a member and contributor of many papers to the A.S.M. and American Society for Testing Materials.

Krivobok Throws Light on Question of Ductility

Reported by J. W. McBean

Ontario Chapter, Feb. 7—Speaker at the February meeting in Hamilton was Dr. V. N. Krivobok of Carnegie Institute of Technology, who took up the structure, characteristics, and idiosyncracies of metals.

Some light was thrown on the question of ductility by a study of forces. A force exerted on a crystal may be resolved into two components, one at right angles to the slip plane and one parallel. If the force parallel to the plane is relatively large, slipping may take place and the metal will be ductile, but if the perpendicular force is greater, the planes may separate without elongation and the metal is brittle.

In the substitutional type of solid solution, atoms of the alloying element, such as nickel, chromium, and cobalt, merely displace a number of iron atoms, forming a simple space lattice, which results in a ductile alloy. In interstitial solid solution the alloying atoms (carbon, boron, etc.) crowd between the iron atoms and form a complex, distorted lattice resulting in brittleness.

Hardening by quenching was illustrated by diagrams showing open and closed gamma fields. For instance, it is not possible to harden a 28% chromium alloy by quenching since that is outside the gamma field, but a 10% alloy is inside the field and can be hardened.

Since time was too short to allow Dr. Krivobok to finish his paper, the Chapter looks forward to hearing the remainder another season.

Automobile Radiators Tend Toward Decreased Weight

Reported by W. A. Gibson

Detroit Chapter, Feb. 10—J. D. Harris, chief engineer of the McCord Radiator & Mfg. Co., addressed the Non-Ferrous Section of the Chapter on the manufacture and application of automotive radiators.

Mr. Harris particularly called attention to the great decrease in weight of radiators per horse-power; for example, a 1917 six-cylinder car of 40 h.p. cost the builder $27 for a radiator having a core weight of 42 lb., as contrasted with $11 for a radiator in a 1936 90-h.p. car with a corresponding weight of 27 lb.

Another startling statement was that the radiator must dissipate over 300,000 B.t.u. per hr.—the equivalent capacity of quite a sizable ice machine.

Mr. Harris described the method used in determining the capacity of a radiator. It is placed in a wind tunnel with provision for passing air at given speeds through the tunnel, passing water at a known temperature and rate, and computing the heat dissipated. He went into considerable detail on the instruments used in obtaining these measurements.

Aluminum Alloying Elements Divided Into Two Classes

Reported by Kurt Siems

Cincinnati, Columbus, and Dayton Chapters, January meetings—Speaker at these meetings was Dr. Kent R. Van Horn of the Aluminum Co. of America, substituting for L. W. Kempf, who was ill. While we had looked forward to meeting Mr. Kempf and hearing him speak on "Light Alloys and Their Applications," we were fortunate indeed in having a "pinch-hitter" such as Dr. Van Horn.

The principal elements that are added to aluminum to form commercial alloys may be divided into two classes. Class 1 consists of those which form commercial binary alloys, namely; Cu, Si, Mn, and Zn. Some 18 other elements, referred to as class 2, do not form useful binary alloys, except Ni and Mn, but are employed to modify or enhance the effects of the class 1 elements. They are Fe, Mn, Ni, Cr, Mo, Ti, Sb, Sn, Pb, Bi, and Na.

In addition to the cast alloys containing 8 and 4% Cu, and the well-known duralumin containing 4% Cu along with Mn and Mg, an alloy identified as 25S is also of the 4% Cu type but contains higher Mn and can be readily hammer forged. Tensile strength in the heat treated condition is about 55,000 psi. and elongation 18%. If small additions of Sn or other elements are added, the tensile and yield strengths are increased; this combination is known as 27S.

Recently two new alloys, XA11S and XC18S, containing copper and small quantities of lead and bismuth, were introduced which are free machining. Various slides, chips, and actual screw machine products illustrated the rapid development of these alloys.

Alpax, containing 13% Si and a small quantity of sodium, is the general purpose alloy in Europe and is one of the most fluid aluminum combinations. With the addition of iron it is the basis of the aluminum die casting industry.

Alloy 43S is fluid, and produces sound castings with fine detail. It contains 5% Si and has relatively low properties, but is used for architectural applications and cooking utensils.

The alloys 355 and 356 are used for complicated castings requiring the strength of the aluminum-copper type but the casting characteristics of the aluminum-silicon type.

An alloy containing 6% magnesium is known as 56S. This material has the unusual properties of about 68,000 psi. tensile and 52,000 psi. yield strength. It is used in considerable quantities for zippers and aluminum screen wire.

Reported by Samuel Epstein

In the discussion of Dr. Van Horn's talk at the Columbus Chapter meeting, questions were asked and answered as follows:

Would aluminum alloys make suitable bearing metals?

There has been little work done on aluminum alloy bearing metals and today there are no extensive applications of aluminum in this field.

What aluminum alloy is recommended for strength at elevated temperatures, as for example, for cylinder heads in aircraft engines?

An alloy containing 6% Mg, 1% Cu, 2% Ni, has the best properties at elevated temperatures, although both 122 and Y alloy have satisfactory properties at elevated temperatures.

How do magnesium-base and aluminum-base alloys compare as to salt water resistance?

Alclad and aluminum alloys containing magnesium have good salt water corrosion resistance. Magnesium-base alloys have inferior resistance and must utilize protective coatings such as dichromate.

Employment

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POSITIONS WANTED

YOUNG METALLURGICAL ENGINEER: Education, experience, ambition. Bachelor and Master of Science in metallurgy, Case School of Applied Science. Research work published. Practical experience in tool and die heat treatment, physical testing, metallography, general steel mill metallurgy, cold drawn and cold finished bar production. Ability to handle men and meet production problems. Box 3-5.

METALLURGIST: Experienced in testing, heat treating, plating, research, and tool steels. College education, 35 years old. Prefers employment near Detroit area. Box 3-10.

METALLURGIST: 32. Alloy steels. Thoroughly experienced in electric melting, heat treating, rolling, sales engineering. Desires responsible position with alloy steel company. Box 3-15.

EXECUTIVE MECHANICAL ENGINEER: Technical training, age 40, married. Practical man with wide experience in manufacture and fabrication of steel, including rolling, pressing, drop forgings, stamping, finishing and heat treating plain and alloy steels. Thoroughly understands manufacturing cost systems, general accounting, purchasing, sales. Draftsman and designer. Will go anywhere. Salary no object. Available at once. Box 3-20.

SUPERINTENDENT OR FOREMAN: All classes of forging and all phases of heat treating. 12 years with one company and 5 with another. An organizer, low costs. Highest references. Box 3-25.

POSITIONS OPEN

ENGINEERING GRADUATE with industrial process experience for sales promotion work for manufacturer of recording instruments and automatic control equipment. Young, single man preferred who is free for acquiring thorough preparation through factory courses and assignments of field work in widely distant locations plus the requirements of market research work at the scene of action. Highest character references required and candidates must show evidence of outstanding ability for writing direct-by-mail printed matter which will pull. Write stating age, education, experience, and salary desired. Box 3-30.

METALLURGIST: For head of metallurgical department of New England company manufacturing small tools. Must have practical experience and technical knowledge of high speed steel hardening and alloy steel treating. Box 3-35.

Non-Ferrous Metals Come Into Their Own in A. S. M.

Reported by J. Q. Adams

Schenectady Chapter, Jan. 21.—Non-ferrous materials seem to have come into their own in the American Society for Metals as shown by the attendance at the Schenectady Chapter meeting when E. H. Dix, Jr., Research Laboratory, Aluminum Co. of America, gave a talk entitled "Competition Among Metals." Although a general subject, the talk centered about the history and development of aluminum. It was very stimulating, especially to many of us who were unfamiliar with the past history of this material and did not realize its potential possibilities. Certainly aluminum is a real competitor to the ferrous metals.

It was shown that a metal is not a real competitor in the material field unless its good qualities are sufficiently important to overbalance the poor qualities. Aluminum offers good qualities: High electrical and heat conductivities, light weight, high resistance to corrosion, and pleasing appearance. With proper design the poor qualities of high cost, low strength, and low modulus of elasticity can be overcome.

Mr. Dix had a real message for the Chapter and showed that non-ferrous metallurgy is a subject which needs cultivating at A.S.M. meetings.

Study of Stress Distribution By Polarized Light Explained

Reported by E. F. Bicknell

Tri-City Chapter, Feb. 11—E. W. P. Smith, consulting engineer of the Lincoln Electric Co., Cleveland, spoke to about 70 members at a dinner meeting held at the LeClaire hotel.

Mr. Smith's address was a study of stress distribution by means of polarized light and its application to welding design. He defined principal stresses, explained polarized light, and demonstrated stress distribution of characteristic joints and sections by means of projected light from a polariscope, using celluloid and bakelite models.

Col. A. G. Gillespie, commanding officer of the Rock Island arsenal, spoke to the chapter immediately after dinner on the subject of "National Defense."

Magnesitic Materials of Quebec Form Base for Specialized Refractories

Montreal Chapter, Jan. 6—A paper given by J. L. Spence and J. W. Craig of Canadian Refractories Limited, Montreal, at the January meeting, dealt with the selection and application of various refractory and insulation products.

The paper dealt principally with the practical problems of furnace refractories, covering a wide variety of equipment. Various types of refractories and their properties were described and the manufacture of fireclay brick reviewed.

Stress was laid on new developments in refractory materials and the economy resulting from their application. The importance of magnesitic materials of Quebec and the many specialties utilizing these products as a base were described. Particular reference was made to a new basic plastic material developed by Canadian Refractories. It has wide application in open-hearth furnace tapholes, back walls, slopes, jambs and ports; and in metal mixers, soaking pits, and heating furnaces.

The various types of refractory cements were covered, including fireclay alone, fireclay with various added bonds, and the higher quality chrome-base cements. The properties of a high grade cement were summarized as a fusion point at least equal to that of the brick, adequate strength at all temperatures, smooth working properties, no shrinkage in drying, and no reaction with the brick. An extremely informative chart was displayed showing a method of calculating the relative value of firebrick. For instance, a brick costing $90 per thousand need last only 27% longer than one at $60 to give equal economy in service.

Insulation was dealt with in detail. Four typical furnaces were shown in cross-section using the same areas but different materials and construction, thus illustrating graphically the initial cost of the furnace, the loss of fuel in heating up, the heat loss by radiation, the total heat loss, the total oil consumption per cycle, and the relative operating time required to pay for the additional cost of insulation.

To close the meeting, three reels of moving picture film were shown of operations at Canadian Refractories Limited, of open-hearth melting, electric furnace steel melting, copper refining, of glass and steel pipe manufacture, of brass and alloy iron foundries, a Portland cement plant, spring coiling and heat treating plant, a malleable iron furnace, and an iron foundry cupola.

Bearings Traced From Babbitt to Modern Alloys

Reported by Ernest B. Drake

Detroit Chapter, Jan. 13—H. C. Mougey, assistant director, Research Laboratories, General Motors Corp., gave an interesting and important discussion of "Plain Bearings" at the Fort Shelby Hotel.

Mr. Mougey gave a historical account of the development of bearings from the discovery of the wheel in very ancient times to the difficult situations met in modern automotive and other complex machines. He traced the development of tin-base bearing metals called babbit (named after Isaac Babbitt, who did not patent the alloy, but rather the method for making a bearing by the use of soft metal backed up with a hard bronze bushing) down to our present day lead-base, cadmium-base and other alloy combinations. He mentioned the work of Dr. Dudley of the Pennsylvania Railroad and others in their attempts to solve the problems arising in railway equipment where bearing loads are heavy.

Mr. Mougey discussed bearing failures at some length and showed that experimental work at General Motors has proven conclusively that failures of soft alloy bearings are most often fatigue failures resulting from oil pressures developed by the rotating part, which are transmitted to the bearing. He stated also that there is no apparent connection between microstructure and bearing characteristics and that the oil itself is of little consequence in this type of failure. Many lubrication, fuel, and bearing problems have been solved and many others are well on the road to solution due to the cooperation of lubrication engineers and automotive engineers.

The lecture was adequately illustrated with animated movies and slides and was followed by a lively discussion.

Talk on Machine Forging Is Recipe for Big Meeting

Reported by Gordon T. Williams

Cleveland Chapter, Feb. 3—Recipe for a whopping big A.S.M. meeting: Have a talk on "Machine Forging." This formula has worked regularly for Cleveland, in 1928, in 1932, and again in 1936, each time bringing out a record crowd.

John H. Friedman, vice-president, National Machinery Co., was the technical speaker, and the audience, near capacity (we mean capacity of the hall, not, generally speaking, personal) found his talk not only highly informative and stimulating, but entertaining as well. Latest developments in the art of machine forging were discussed and described, then illustrated by motion pictures and actual pieces.

Forging practice has moved steadily forward and numerous innovations have been made since the Chapter's last forging meeting. Production methods on the horizontal forging machine and the newer vertical Maxipres were explained and a few examples of cold forging shown. Coining of malleable castings, steel forgings and castings, hot upsetting and piercing, were all clearly presented and the place of machine forging in modern production clearly developed.

Because this was Sustaining Members' Night, 35 dignitaries representing the Chapter's Sustainers were guests at the dinner. As Chairman Pulsifer introduced them one by one, we all had reason to consider how important are the liberal contributions of these companies toward the services of the Chapter to all members.

A nominating committee composed of three past chairmen, Benninghoff, Ross and Van Horn, was instructed to present a slate at the March meeting.

Coffee talker—or perhaps, whisperer—was our national secretary and good friend, Bill Eisenman. His severe cold would have stopped him had the microphone not been at hand. With the aid of science, Bill's voice was sufficiently amplified that all could hear his witty remarks.

Al Diemer, a brand new member, won the free dinner, the offering of which offends Mr. Farley's moral scruples—to say nothing of your correspondent and about 50 others who have been buying for years with nary a free one.

Movie, Cartoons Illustrate Dunbar's Talk on Grinding

Reported by B. R. Queneau

Northwest Chapter, Feb. 11—H. W. Dunbar, manager of the Grinding Machine Division of the Norton Co., Worcester, Mass., covered the important subject of grinding at a meeting held at the Minnesota Union. A sound and motion picture entitled "The Alchemist's Hour Glass" was shown to give an idea of the range of uses of abrasives in industry.

The film was followed by a lecture illustrated in a unique manner. In caricature Mr. Dunbar drew attention to the various principles and phases of grinding. The cartoons served to emphasize the points and hold the listeners' attention, while the talk showed the need for greater refinement and accuracy in grinding.

He paralleled his remarks with an explanation of the developments taking place permitting measurement of minute errors, and defined the difference between grinding, lapping, honing and polishing. Various surface characteristics and finish were explained and the importance that grinding will play in future developments in the mechanical world was pointed out.

Free Literature — Mail Coupon Below

Thermal Analyzer
Laboratory furnace equipment designed to conduct grain size test, creep tests, thermocouple calibration, coefficients of expansion, combustion analysis, gas atmosphere experiments, dilatometry, and general thermal exploration. Also for precision heat treatment. Stanley P. Rockwell Co. Bulletin Aya-121.

Corrugated Ingots
The Gathmann Engineering Co. has published a new booklet called "Gathmann Ingot Molds—Their Purpose and Design." It illustrates various corrugated ingot contours designed to produce defect-free surface in steel ingots. Bulletin Aya-13.

Falcon Equipment
Three preprints of articles from the technical press describe Falcon electrically heated coating and saturation tanks, asphalt pipe coating tanks, and stress relieving heaters for piping and nozzles. H. O. Swoboda, Inc., is responsible for their distribution. Bulletin R-155.

Machining Handbook
This little handbook giving machining properties and a great deal of other related data for a wide variety of steels should be of much value in aiding the steel user to select the right steel for the right purpose. Union Drawn Steel Co. Bulletin Ox-83.

Firebrick
Babcock & Wilcox make an insulating firebrick which is refractory as well as insulating and can be used without a facing of firebrick. Description, applications, and engineering data are contained in Bulletin Fy-75.

Potentiometers
The construction and outstanding features of Brown potentiometer pyrometers are briefly described in an illustrated folder by Brown Instrument Co. Convincing testimonial letters from users are reproduced. Bulletin Sx-3.

Bench Type Furnace
American Electric Furnace Co. has a new bulletin describing their new bench-type electric furnace for low cost, high speed hardening. It can be used for all types of high speed steel. Bulletin Jya-2.

Ferro-Alloys
An interesting folder by Electro Metallurgical Co. tells all about their ferro-alloys and their special service to users which will help them to operate their furnaces and make alloy additions under the proper conditions. Bulletin Jya-16.

Laboratory Furnaces
Tiny induction furnaces which will melt ½ lb. of steel in 8 min. or 4 lb. of copper in 35 min. find a wide variety of uses in many kinds of laboratories. Ajax Electrothermic Corp. tells all about these small laboratory furnaces and the 3-kw. converter used with them in Bulletin Ox-41.

Standard Burners
Surface Combustion Corp.'s burners are built in 47 different types and more than 400 different sizes. Descriptions and illustrations of many of them are given in Bulletin Jyx-51.

Brass Shapes
A general classification of the diversified products made by the American Brass Co. comprises copper and copper alloyed with zinc, tin, nickel, lead, silicon and manganese in all combinations that can be wrought into sheets, wire, rods, tubes and special shapes. Bulletin Ox-89.

Pyrometer Accuracy
A thought-provoking folder of Hoskins Mfg. Company explains how the use of Chromel-Alumel for pyrometer lead-wires makes it possible to take full advantage of modern pyrometric instruments. Bulletin Ob-24.

Silico-Manganese Steel
Silico-manganese steel for heavy duty springs is the subject of Bethlehem Steel Co.'s new folder giving its properties and recommendations for heat treatment. Bulletin Jyx-76.

Rustproofed Steel
Atmosphere does not corrode steel which has been rustproofed with Duozinc, a mercury-containing zinc anode with marked production properties. Full details are given in a folder issued by the R. & H. Chemicals Dept. of duPont. Bulletin Ar-29.

Burners and Valves
Auxiliary equipment for industrial furnaces that will insure proper heat production and correct combustion, such as oil and gas burners, blowers, regulating and shut-off valves, is fully described in Mahr Mfg. Co.'s illustrated booklet. Bulletin Jyx-5.

Spoilage Insurance
C. I. Hayes, Inc. has compiled a record of reports from over 300 users of their "Certain Curtain" controlled atmosphere furnaces showing how these furnaces have cut down spoilage in the heat treatment of tools and parts. Bulletin Sx-15.

Vanadium Facts
Revived after nearly 20 years is the house organ of Vanadium Corp. of America, "Vanadium Facts." This paper shows considerable thought and care in its preparation and contains valuable and interesting information on vanadium steels. Bulletin Ox-27.

Tool Room Furnace
A new type of lining and one-valve control are two of the features of the American Gas Furnace Co.'s new tool room oven furnace that would make it economical to replace many older furnaces now in operation. Fully described in Bulletin Ox-11.

Fast-Cutting Steel
Bliss & Laughlin, Inc., offer an interesting technical folder on Ultra-Cut Steel, giving performance records of this high-speed screw stock on automatic screw machines. Physical data and microstructures are presented. Bulletin Ob-42.

Low-Cost Controller
Leeds & Northrup has a new low cost Micromax controller for use where simple "on-off" control is adequate without indication or record, and where first cost must be low. Described in Bulletin Myx-46.

Vertical Carburizer
The Hevi Duty electric vertical retort carburizer is particularly applicable to intricate parts and selective carburization, where distortion must be held to a minimum. It is described in Bulletin Mya-44.

Welding Metallurgy
J. H. Critchett, vice-president of Union Carbide & Carbon Co., has prepared an exceptionally informative discussion of the physical and chemical principles involved in the oxy-acetylene welding of steel. Bulletin Ayx-63.

Stainless Slide Chart
Carpenter Steel Co.'s pocket-size slide chart gives at a glance the technical data on all stainless steels. Bulletin Jyx-12.

3 Tool Steels
Three little folders concisely describe three types of SKF tool steels, give their uses and recommendations for heat treatment. They are a carbon tool steel, an oil hardening steel, and a high alloy general purpose tool steel. Bulletin Ox-78.

Chapmanizing
Chapmanizing, the new method of surface hardening steel with nitrogen, is described in a very attractive booklet of Chapman Valve Mfg. Co. Information is given out on the method itself and on its metallurgical advantages. Bulletin Ob-80.

Expansion Data
Of particular interest to the designing engineer is a data sheet from the International Nickel Co. which gives thermal expansion characteristics of nickel cast iron and shows this material to be well suited for parts operating in wide temperature ranges. Bulletin Mya-45.

Liquitol
The use of Liquitol for controlled cooling of iron and steel castings and ingots is fully described in a bulletin by Alpha-Lux Co., Inc. Bulletin Mya-120.

Gas Combustion
A large number of variables influence the operating temperatures and combustion of industrial gas. A well-illustrated report by the American Gas Association covers this complex technical subject. Bulletin Mya-119.

Pure Metals
Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Mya-64.

Optical Aids
A toolmaker's microscope, an optical gage, and optical flats are some of the instruments useful in routine production, inspection, research and experimental work that form the subject of a booklet issued by Bausch & Lomb Optical Co. Bulletin Mya-35.

Case Hardening Control
Latest booklet in monograph form gives useful information to all those interested in hardening steel. By A. F. Holden Co. Bulletin Mya-55.

Toncan Iron
Republic Steel Corp. has issued a 12-page folder containing a large fund of condensed, up-to-date information on rust resisting Toncan copper-molybdenum iron, including complete physical properties and physical constants. Bulletin Mya-8.

Abrasion Resisting
Striking indeed is the yellow-covered publication by Carnegie-Illinois Steel Corp. giving the history of AR steel, a low-priced abrasion resisting steel, and showing actual results in service as compared to ordinary mild steel. Bulletin Mya-85.

Capacitrol
An indicating control pyrometer is made by Thermo-Control Devices, Inc., known as the Wheelco Capacitrol. Their bulletin gives full description, wiring diagrams for different furnace or oven installations, and price. Bulletin Mya-110.

Mo-Cr-Ni Forgings
A real text is presented by A. Finkl & Sons Co. on heat treated molybdenum-chromium-nickel steel forgings for heavy machinery. The illustrations and physical property tables and curves speak for themselves. Bulletin Mya-23

Degreasing
An eye-taking cover leads one to read the inside of a folder by Detroit Rex Products Co. telling why modern equipment and solvents make degreasing and cleaning an efficient and inexpensive operation. Bulletin Mya-111.

Melting Costs
Comparative melting costs using various types of crucible open-flame, electric, oil and gas fired furnaces were computed by R. H. Stone in *Metal Industry* in 1933 and are reprinted by Campbell-Hausfeld Co. Bulletin Mya-117.

Nitriding Steels
Nitralloy is manufactured in three types for various applications of nitrided products, and a special alloy steel "Nitrard" is produced by The Nitralloy Corp. Nitricastiron is also described in addition to these steels. Bulletin Mya-116.

Multi-Color Records
A handsome booklet describing Foxboro's multi-color potentiometer recorder for 2, 3, 4, or 6 temperatures reproduces charts in actual color. Specifications for one model are given. Bulletin Myx-21.

Forgings
The story of Heppenstall forgings is told in photographs augmented by explanatory text. Eight pages of reference tables add to the value of this book to anyone who uses steel forgings or shapes. Bulletin Mya-122.

Grinding Lubrication
A handy outline for the selection of grinding wheels is one of the useful features of a booklet full of facts about grinding solutions. D. A. Stuart & Co. Bulletin Mya-118.

Tool Steel Catalog
A new catalog lists and describes the complete line of tool steels manufactured by Columbia Tool Steel Co. Bulletin Mya-115.

Neophot
"Neophot" is the name of a new metallograph of radically new design and universal adaptability. A pamphlet distributed by Carl Zeiss, Inc., gives its applications and features and is well illustrated with beautiful samples of micrographic work. Bulletin Jx-28.

High Tensile Steels
Three types of high tensile steel particularly adapted to the transportation industries are described in a folder from U. S. Steel Corp. These are a chromium-copper-silicon steel for corrosion resistance, a medium manganese steel, and a strong structural silicon steel. Bulletin Mx-79.

Nickel-Copper Steels
Exceptional resistance to corrosion and abrasion, increased tensile strength, and higher ductility are the qualities claimed for Youngstown Sheet & Tube Co.'s new series of Yoloy steels. A summary of properties and notes on their characteristics are contained in Bulletin Ox-93.

Furnace Insulation
Johns-Manville offers to those who design or operate furnaces a new 72-page book describing insulation methods which improve performance and reduce operating costs. Requirements for each particular type of heating equipment are analyzed and detailed recommendations made accordingly. Bulletin Ox-100.

Wide-Strip Pyrometer
Full details of the many important features incorporated in the Bristol Co.'s new wide-strip potentiometer pyrometer with simplified measuring, self-balancing, and self-standardizing mechanism are contained in Bulletin Jya-87.

Sicromo Steel
Timken Steel & Tube Co. has developed Sicromo steel for applications requiring a reasonable degree of resistance to both corrosion and oxidation on an economic basis. Complete technical information, tables and curves are given in a set of data sheets. Bulletin Jya-71.

Bright Annealing
Electric Furnace Co. tells about their controlled atmosphere furnaces for continuous deoxidize annealing, bright normalizing and annealing ferrous and non-ferrous metals. Work comes clean, bright and dry from these furnaces. Bulletin No-30.

Castings for High Heat
The compositions, properties and uses of Driver-Harris Co.'s Nichrome, Chromax, and Cimet, and other alloys for high temperature and corrosion resistance are given in a new illustrated folder. Bulletin Nx-19.

Centricast Boxes
The story of centrifugally cast carburizing and annealing boxes—their reason for being, method of production, properties, and advantages—is made extremely readable in a folder by Michigan Steel Casting Co. Bulletin Jya-84.

Rotoblast
A new blast cleaning machine eliminates the need for compressed air as the abrasive driving agent. Pangborn Corporation tells how a rapidly spinning wheel propels the abrasive by controlled centrifugal force. Bulletin Ox-68.

Turbo Compressors
The new items in Spencer Turbine Co.'s bulletin are a new and smaller "Midget" turbo for individual mounting, a single-stage line which effects new economies, and the gas-tight turbos for acid and explosive gases. Bulletin Mx-70.

Gas-Fired Cyclone
Lindberg Steel Treating Co. has announced a gas-fired Cyclone furnace as a companion to the electric Cyclone. Complete data in the form of diagrams, charts, photographs, and blueprints are found in a new catalog. Bulletin Jya-66.

Heat Treating Manual
A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Melting Furnaces
A leaflet by Campbell-Hausfeld Co. describes complete melting units for oil or gas using cast pots of a special composition. Bulletin Fy-117.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Small Tool Furnace
The Sentry Model "Y" is offered especially for small tools, whether hardened on a production or intermittent basis. This furnace is described by the Sentry Co. in Bulletin Fy-114.

Foundry Metallograph
Today's engineering cast irons are structure-controlled in the foundry. The E. Leitz simplified micrometallograph MM-2 is particularly adapted to foundry applications. Bulletin Fy-47.

Liqu'd Carburizing
E. F. Houghton's Perliton liquid carburizer is the subject of a 23-page booklet. Depth of case, speed of penetration, and other results are well illustrated with graphs and photomicrographs. Bulletin Nv-38.

Alloy Castings
A new bulletin on corrosion and heat resisting alloy castings is offered by Michiana Products Corp., manufacturers of Fire Armor and Zorite and other heat and acid resisting castings. Bulletin Jyx-81.

Testing with Monotron
Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

Stainless Steel Uses
The wide range of applications of Allegheny Metal, best known of Allegheny Steel Co.'s corrosion and heat resistant steels, is pictorially covered in a new and interesting booklet. Bulletin Ob-92.

Aluminum News
A cleverly written, well-illustrated newspaper of interesting items about aluminum is issued by Aluminum Co. of America every month. The latest issue is Bulletin Jyx-54.

Compressors
B. F. Sturtevant Co. has a line of centrifugal compressors designed particularly for industrial furnace applications. These are illustrated and described in Bulletin Myx-58.

Rockwell Tester
The Rockwell Superficial Hardness Tester is applicable to far thinner sheet and strip than the regular Rockwell. Its use for nitrided and case hardened parts is also described by Wilson Mechanical Instrument Co. in Bulletin Myx-22.

Titanium in Steel
The use of ferro-carbon-titanium in steel is thoroughly described in a booklet of Titanium Alloy Mfg Co. Titanium's application in forgings, castings, rails, sheets and plates is interestingly explained. Bulletin M-90.

Moly Matrix
Climax Molybdenum Co.'s little monthly newspaper contains many interesting and informative articles. Get the latest issue—Bulletin Ax-4.

Carburizing Retorts
Low cost, flexibility, uniformity, control, quality, and less labor with retort gas carburizing, says American Gas Furnace Co. Rotary, vertical and bell type retorts are described in Bulletin Jyx-11.

Recuperators
Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Kanthal Alloys
C. O. Jelliff Mfg. Co. offers a descriptive booklet on Kanthal alloys. Certain of these alloys may be used as resistance elements; others are for furnace parts or other heat resisting applications. Full details are given in Bulletin Je-78.

The Review,
7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature described in the March issue. (Please order by number only.)

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Chapter Heads Plan Activities for Future

The officers, Executive Committee and committee chairmen of the Cincinnati Chapter held a dinner meeting Friday evening, Jan. 3, at the Gibson Hotel. Activities of the Chapter during 1935 were reviewed and plans discussed for the future. Much was accomplished in formulating a program to increase membership and place the Chapter in a position commensurate with the industrial importance of the city of Cincinnati.

An outline was prepared for the Tri-Chapter meeting (Cincinnati, Dayton, and Columbus) to be held April 21 in Cincinnati. Chairman of the meeting will be Prof. G. M. Enos of the University of Cincinnati. The morning will be devoted to plant visits and an afternoon technical session will be addressed by E. F. Davis of Warner Gear Co. on the subject of "Gears."

The intensive membership campaign inaugurated in the fall of 1935 has shown very gratifying results, adding 29 members to the roster up to Jan. 20.

Machinability Reviewed, Developments in Tools Outlined by d'Arcambal

Reported by Richard R. Kennedy

Dayton, Columbus, and Cincinnati Chapters, February meetings—A. H. d'Arcambal, consulting metallurgist of Pratt & Whitney Co., Hartford, Conn., was the principal speaker at the three meetings held on successive nights. His subject was "Machinability."

Factors affecting machinability are the type and condition of the machines, type and condition of the tools, the material machined, and the cutting fluids. While machine tools are now purchased with careful attention to quality and applicability, the cutting tools are too often neglected.

Metals vary greatly in machinability from high sulphur and ordinary screw stock, used where tensile strength is not important, down to soft, gummy S.A.E. 1020. High sulphur open-hearth and high manganese acid open-hearth steels are widely used for good machinability with higher strength. Molybdenum is the only alloying element which seems to improve machinability.

The influence of cutting fluids is often overlooked. Sulphur-base oils are widely used as cutting fluids for steel with great success. Kerosene or a mixture of fuel oil and kerosene are used in machining aluminum and magnesium alloys.

Recent developments in cutting tools are an increased use of high speed steel for taps and reamers, of chromium plated tools and nitrided tools, and continued progress in the hard carbide materials.

A number of interesting points were brought out in the discussion at Dayton. A cyanide bath is superior to the ammonia gas method for nitriding tools. Some steel such as high speed which will retain its hardness at high heat must be used, since a hard core as well as a hard case is necessary for satisfactory tool performance.

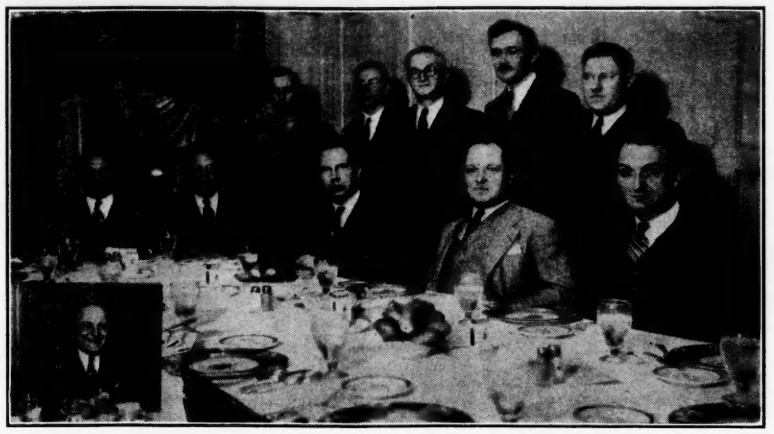
The chromium plating process for tools and gages must be carefully controlled as to thickness and adherence of the plate and prevention of hydrogen embrittlement.

FOR SALE

Micro metallograph equipment, Leitz, complete with camera and lenses. Also Guthrie Leitz single-spindle automatic polishing machine, one Spencer and one Zeiss microscope and two Troemner balancers. All A-1 condition. Full details furnished if desired.

Address Box 3-2
AMERICAN SOCIETY *for* METALS
7016 Euclid Ave. Cleveland, O.

Cincinnati Executive Committee Meeting



Seated, left to right: Walter D. Archea, chairman, Cincinnati Chapter; H. Stanley Binns, chairman, Membership Committee; George M. Enos, member Executive Committee; Voigt Proctor, member Executive Committee; N. M. Salkover, chairman, Small Tool Group, Educational Committee.

Standing, left to right: Howard E. Waldo, chairman, Finance Committee; H. C. Murrer, chairman, Sheet Metal Group, Educational Committee; E. W. Esslinger, member Executive Committee; Carl O. Graves, chairman, Educational Committee; Reid L. Kenyon, member Executive Committee.

Insert: Kurt Siems, secretary-treasurer, Cincinnati Chapter.

Stress-Strain Relations in High Temperature Alloys

Reported by Walter Troy

Notre Dame Group, Feb. 14—The February meeting of the Group was held on the campus of the University of Notre Dame. Francis B. Foley, superintendent of research at Midvale Steel Co., addressed the assembly on "Steel Alloys for High Temperatures."

Since stress-strain relations constituted the chief consideration, the influence of temperature on state and the relation of state to slip, flow, and deformation were established. The analogy existing between the structure of the grain boundaries and that of glass was discussed. This analogy has been used to explain that, at a definite elevated temperature, intercrystalline flow replaces the characteristic intracrystalline slip resulting at room temperatures, but Mr. Foley suggested that the movement of atoms at grain boundaries during grain growth could account for grain boundary weakness at elevated temperatures.

The duration of some of the creep tests was rather impressive. For instance, in one determination, samples have been at temperature for over 2½ years. The failure of 18-8 steel was explained on the basis of certain structural changes and the previous thermal history of the alloy.

Bain Talks on Grain Size At N. J. Chapter Meeting

Reported by Elton W. Jenkins

New Jersey Chapter, Feb. 10—The sixth regular meeting was attended by 100 members at dinner and approximately 400 at the lecture. Speaker of the evening was E. C. Bain, United States Steel Corp.

Mr. Bain's address on grain size has already been outlined in detail in the January REVIEW.

The Chapter was honored by a visit of Secretary Eisenman and Louis Chevrolet, in addition to members of the New York and Lehigh Valley Chapters.

Through the courtesy of John B. Gambling and Broadcast Brand Products, this meeting was announced over radio broadcasting station WOR.

At the beginning of the year the Membership Committee set out to increase this chapter to 500 members. The indications are that this goal will have been reached before the end of the educational course on Metallurgy of Non-Ferrous Materials.

WANTED

One used Charpy or Izod machine in good condition.

Address Box 3-1
American Society for Metals
7016 Euclid Ave. Cleveland, O.

Tensile, Impact Strength Affected by Case Depth

Reported by B. R. Queneau

Northwest Chapter, Jan. 14—An interesting paper was presented by P. A. Birchfield, metallurgist of the Fairfield Mfg. Co. and the Ross Gear and Tool Co. of Lafayette, Ind. The subject was "The Effect of Case Depth on the Tensile and Impact Properties of Carburizing Steels."

Mr. Birchfield reported investigations occasioned by receipt of specifications calling for 0.035-in. case, whereas a 0.090-in. case is ordinarily specified. Izod impact and standard tensile specimens of various case depths were given a single reheat treatment and broken. The results showed that any case is damaging to both tensile and impact strength and that as the case depth is increased, the impact and tensile strength are further reduced.

Brinell tests indicated that increasing the core hardness will frequently permit a reduction of case depth without loss of Brinell resistance.

S.A.E. 1030 can be produced with a 0.010-in. case to a higher impact strength than some alloys carburized more deeply; if the core hardness is between Rockwell C-35 and 45, the tensile strength is comparable to that of the best alloy steels.

Experimental evidence and field experience seem to indicate that a carbon content of 0.25 to 0.30% with the minimum case depth that will give the necessary indentation resistance produces maximum strength and toughness, particularly in low alloy materials.

Welding Similar To Melting and Casting Process

Reported by E. W. Moore

Rochester Chapter, Jan. 20—The monthly meeting was held jointly with the Production Managers and Superintendents Group of the Rochester Chamber of Commerce. The Chapter finds this joint meeting very interesting, educational, and pleasurable, and hopes to see it become a yearly event.

After dinner the group adjourned to the Assembly Hall to be welcomed by M. D. Lee, chairman of the Production Managers and Superintendents. Our chairman, Leo J. Sullivan, then rendered felicitations and appreciation in the familiar Sullivan technique.

The speaker of the evening needed no introduction. In the high court of metallurgy he is Dr. T. Holland Nelson, consulting metallurgist for Midvale Steel Co., but we of the Rochester Chapter like to think of him as the affable, personable "Tom" Nelson.

Dr. Nelson's subject, "A Somewhat different view of welding," was a complete investigation of the phenomena occurring inside the wrought metal and the weld metal, and the condition of the metals after welding and heat treatment. At the outset Dr. Nelson made it clear that welding is one of the oldest of the iron and steel making processes, and is not a matter of a few weeks' training in the dropping of globules of melted metal between two plates of metal. Sound welding requires a working knowledge of the fundamentals of iron and steel melting and ingot casting.

A series of macrographs, photomicrographs, and radiographs permitted a clear demonstration of the various classifications of welding. Welds made with bare rods showing considerable porosity and low tensile were contrasted with welds made with a high grade coated rod, which controls the atmosphere and slag and produces homogeneous welds with high tensile and comparatively free from porosity and other defects.

Atomic hydrogen welding and the welding of 18-8 stainless steel were explained in detail. Resistance welding again reveals that an ingot is cast in the two sheets of metal. The high spot of Dr. Nelson's address was his exposition of shotwelding, which served to demonstrate the three elements essential to sound welding practice—pressure, temperature, and time.

The questions and answers after Dr. Nelson's talk brought out many interesting facts. "What shall be done about the heat treatment of building welds?" was asked by Mr. Eckberg. Dr. Nelson believes that there will be considerable development of heat treatment in the near future and that stress relief at 1200° F. will soon be considered insufficient even on carbon steel jobs.

Professor Sauveur

has just completed a thorough revision of his famous work on heat treatment and metallography of iron and steel. Since publication of the first edition in 1916 this widely quoted book has been the authority on this subject. This, the fourth edition, includes two new chapters and is completely revised.

The Metallography and Heat Treatment of Iron and Steel

By ALBERT SAUVEUR
Professor of Metallurgy and Metallography
Harvard University

Fourth Edition. 550 pages, 7¼x10½, 475 illustrations, $8.00

If you're interested in this subject, you will want this up-to-the-minute authority on your desk. Write us for the new fourth edition of this world-famous book without delay.

American Society for Metals

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